CLAIMS

I claim:

1. A heating pad system useable for warming a person on a support structure, the heating pad system comprising:

a thermal-electric heating element comprising one or more copper braids suspended in a carbon-filled plastic for conducting electricity;

a viscoelastic foam pad disposed adjacent to the thermal-electric heating element, the viscoelastic foam pad overlaying at least a portion of the heating element;

a form-fitting waterproof cover enclosing at least a portion of the viscoelastic foam pad and the thermal-electric heating element, the thermal-electric heating element, the viscoelastic foam pad and the waterproof cover comprising a heating pad positionable on the support structure;

a sealed connector attached to the form-fitting waterproof cover, the sealed connector having an external interface, the sealed connector providing an electrical connection between the external interface and the thermal-electric heating element; and

a power unit connectable to the external interface of the sealed connector for providing electrical power to the thermal-electric heating element, the power unit including a control panel having at least one temperature selector, the temperature selector for selecting at least one heating pad temperature.

2. The heating pad system of claim 1 wherein the viscoelastic foam pad is an upper foam pad, the heating pad system further comprising;

a lower foam pad, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad, the waterproof cover enclosing at least a portion of the upper foam pad, the lower foam pad and the thermal-electric heating element, wherein the thermal-electric heating element, the upper and lower

foam pads, and the waterproof cover comprise the heating pad positionable on the support structure.

3. The heating pad system of claim 1 wherein the viscoelastic foam pad has an upper surface, and wherein the heating pad system further comprises:

a temperature sensor for measuring heating pad temperatures, wherein at least a portion of the temperature sensor is positioned adjacent to the upper surface of the viscoelastic foam pad, the temperature sensor being operably connected to the power unit, and wherein the power unit includes a temperature control circuit coupled to the temperature sensor to control electrical power provided to the thermal-electric heating element based on a selected heating pad temperature and a measured heating pad temperature.

4. The heating pad system of claim 1 wherein the viscoelastic foam pad has an upper surface and the power unit includes a temperature display for displaying measured heating pad temperatures, and wherein the heating pad system further comprises:

a temperature sensor for measuring heating pad temperatures, wherein at least a portion of the temperature sensor is positioned adjacent to the upper surface of the viscoelastic foam pad, the temperature sensor being operably connected to the power unit for providing measured heating pad temperatures to the temperature display.

5. The heating pad system of claim 1 wherein the viscoelastic foam pad is an upper foam pad having an upper surface, and wherein the heating pad system further comprises:

a heating element sleeve enclosing at least a portion of the thermal-electric heating element, at least a portion of the heating element sleeve comprising an insulation layer;

a lower foam pad, the heating element sleeve and the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad, the

waterproof cover enclosing at least a portion of the upper foam pad, the lower foam pad, the heating element sleeve and the thermal-electric heating element, wherein the thermal-electric heating element, the heating element sleeve, the upper and lower foam pads, and the waterproof cover comprise the heating pad positionable on the support structure;

a first temperature sensor for measuring heating pad temperatures, wherein at least a portion of the first temperature sensor is positioned adjacent to the upper surface of the upper foam pad, the first temperature sensor being operably connected to the power unit, and wherein the power unit includes a temperature control circuit coupled to the temperature sensor to control electrical power provided to the thermal-electric heating element based on a selected heating pad temperature and a measured heating pad temperature; and

a second temperature sensor for measuring heating pad temperatures, wherein at least a portion of the second temperature sensor is positioned adjacent to the upper surface of the upper foam pad, the second temperature sensor being operably connected to the power unit, and wherein the power unit includes a temperature display for displaying measured heating pad temperatures received from the second temperature sensor.

6. A heating pad system useable for warming a person on a support structure, the heating pad system comprising:

a thermal-electric heating element;

a foam pad positioned adjacent to the thermal-electric heating element, the foam pad covering at least a portion of the thermal-electric heating element, the thermal-electric heating element and the foam pad comprising a heating pad positionable on the support structure; and

a power unit for providing electrical power to the thermal-electric heating element, the power unit including a control panel having at least one temperature selector, the temperature selector for selecting at least one heating pad temperature.

7. The heating pad system of claim 6 wherein the foam pad is an upper foam pad, the heating pad system further comprising:

a lower foam pad, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad, the thermal-electric heating element and the upper and lower foam pads comprising the heating pad positionable on the support structure.

8. The heating pad system of claim 6 wherein the support structure is an operating room table.

9. The heating pad system of claim 6 wherein the heating pad further comprises a waterproof and antimicrobial cover enclosing at least a portion of the foam pad and the thermal-electric heating element.

10. The heating pad system of claim 6 wherein the foam pad is a rectilinear upper foam pad, the heating pad system further comprising:

a rectilinear lower foam pad, the heating element being sandwiched between the rectilinear upper foam pad and the rectilinear lower foam pad, the thermal-electric heating element and the upper and lower rectilinear foam pads comprising the heating pad positionable on the support structure.

11. The heating pad system of claim 6 wherein the foam pad is an upper foam pad, the heating pad system further comprising:

a lower foam pad, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad;

a waterproof and antimicrobial cover enclosing at least a portion of the upper foam pad, the lower foam pad, and the thermal-electric heating element, wherein the thermal-electric heating element, the upper and lower foam pads, and the waterproof and antimicrobial cover comprise the heating pad positionable on the support structure; and

a sealed connector secured to the waterproof and antimicrobial cover, the power unit providing electrical power to the thermal-electric heating element via a utility cord connected to the sealed connector.

12. The heating pad system of claim 6 wherein the foam pad is a first foam pad, wherein the thermal-electric heating element is a first thermal-electric heating element, wherein the heating pad is a first pad portion, and wherein the heating pad system further comprises:

a second thermal-electric heating element;

a second foam pad positioned adjacent to the second thermal-electric heating element, the second foam pad covering at least a portion of the second thermal-electric heating element, the second thermal-electric heating element and the second foam pad comprising a second pad portion, wherein the power unit provides electrical power to the first and second thermal-electric heating elements; and

a flexible coupling, the flexible coupling providing a hinge-like connection between the first pad portion and the second pad portion.

13. The heating pad system of claim 6 wherein the foam pad is an upper foam pad, the heating pad system further comprising:

a lower foam pad, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad; and

a sleeve enclosing at least a portion of the thermal-electric heating element between the thermal-electric heating element and the upper and lower foam pads.

14. The heating pad system of claim 6 wherein the foam pad is an upper foam pad, the heating pad system further comprising:

a lower foam pad, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad; and

a sleeve enclosing at least a portion of the thermal-electric heating element between the thermal-electric heating element and the upper and lower foam pads,

wherein the sleeve has a top portion comprising a nonwoven polyester sheet and a bottom portion comprising an insulation layer.

15. The heating pad system of claim 6 wherein the heating pad further comprises:

a sheet of reflective material positioned adjacent to the foam pad, the foam pad being disposed between the sheet of reflective material and the thermal-electric heating element.

16. The heating pad system of claim 6 wherein the heating pad further comprises:

a reflective polyethylene material positioned adjacent to the foam pad, the foam pad being disposed between the reflective polyethylene material and the thermal-electric heating element.

17. The heating pad system of claim 6 wherein the foam pad has an upper surface, and wherein the heating pad system further comprises:

a temperature sensor for measuring heating pad temperatures, at least a portion of the temperature sensor being positioned adjacent to the upper surface of the foam pad, the temperature sensor being operably connected to the power unit, the power unit including a temperature control circuit coupled to the temperature sensor to control electrical power provided to the thermal-electric heating element based on a selected heating pad temperature and a measured heating pad temperature.

18. The heating pad system of claim 6 wherein the foam pad has an upper surface, and wherein the heating pad system further comprises:

a temperature sensor for measuring heating pad temperatures, at least a portion of the temperature sensor being embedded in the foam pad adjacent to the upper surface of the foam pad, the temperature sensor being operably connected to the power unit, the power unit including a temperature control circuit coupled to the

temperature sensor to control electrical power provided to the thermal-electric heating element based on a selected heating pad temperature and a measured heating pad temperature.

19. The heating pad system of claim 6 wherein the foam pad has an upper surface and the power unit includes a temperature display for displaying measured heating pad temperatures, and wherein the heating pad system further comprises:

a temperature sensor for measuring heating pad temperatures, wherein at least a portion of the temperature sensor is positioned adjacent to the upper surface of the foam pad, the temperature sensor being operably connected to the power unit for providing measured heating pad temperatures to the temperature display.

20. The heating pad system of claim 6 wherein the foam pad has an upper surface and the power unit includes a temperature display for displaying measured heating pad temperatures, and wherein the heating pad system further comprises:

a temperature sensor for measuring heating pad temperatures, wherein at least a portion of the temperature sensor is embedded in the foam pad adjacent to the upper surface of the foam pad, the temperature sensor being operably connected to the power unit for providing measured heating pad temperatures to the temperature display.

21. The heating pad system of claim 6 wherein the foam pad has an upper surface and the power unit includes a digital numeric temperature display for displaying measured heating pad temperatures, and wherein the heating pad system further comprises:

a temperature sensor for measuring heating pad temperatures, wherein at least a portion of the temperature sensor is positioned adjacent to the upper surface of the foam pad, the temperature sensor being operably connected to the power unit for providing measured heating pad temperatures to the temperature display.

22. The heating pad system of claim 6 wherein the foam pad has an upper surface and the power unit includes a temperature display for displaying measured heating pad temperatures, and wherein the heating pad system further comprises:

a first temperature sensor for measuring heating pad temperatures, at least a portion of the first temperature sensor being positioned adjacent to the upper surface of the foam pad, the first temperature sensor being operably connected to the power unit, the power unit including a temperature control circuit coupled to the first temperature sensor to control electrical power provided to the thermal-electric heating element based on a selected heating pad temperature and a measured heating pad temperature; and

a second temperature sensor for measuring heating pad temperatures, wherein at least a portion of the second temperature sensor is positioned adjacent to the upper surface of the foam pad, the second temperature sensor being operably connected to the power unit for providing measured heating pad temperatures to the temperature display.

23. The heating pad system of claim 6 wherein:

the foam pad is comprised of a viscoelastic foam; and

the thermal-electric heating element is comprised of a carbon-filled plastic having one or more copper braids that receive electrical current for generating heat.

24. The heating pad system of claim 6 wherein:

the foam pad is an upper foam pad comprised of a viscoelastic foam;

the thermal-electric heating element is comprised of a carbon-filled plastic having one or more copper braids that receive electrical current for generating heat; and

the heating pad system further comprises a lower foam pad comprised of a high-resiliency foam, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad.

25. The heating pad system of claim 6 wherein:

the foam pad is an upper foam pad comprised of a slow-recovery viscoelastic foam weighing at least approximately 4 lb. per cubic foot and having an IFD rating of at least approximately 20;

the thermal-electric heating element is comprised of a carbon-filled plastic having one or more copper braids that receive electrical current for generating heat; and

the heating pad system further comprises a lower foam pad comprised of a high-resiliency foam weighing at least approximately 2.6 lb. per cubic foot and having an IFD rating of at least approximately 34, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad.

26. The heating pad system of claim 6 wherein the thermal-electric heating element is comprised of one or more copper elements for generating heat.

27. The heating pad system of claim 6 wherein the thermal-electric heating element is comprised of three longitudinally oriented copper braids suspended in a carbon-filled plastic, the carbon-filled plastic being at least substantially radiolucent.

28. The heating pad system of claim 6, further comprising:

an alternating pressure pad positioned adjacent to the thermal-electric heating element, the alternating pressure pad covering at least a portion of the thermal-electric heating element.

29. The heating pad system of claim 6 wherein the foam pad is an upper foam pad, the heating pad system further comprising:

a lower foam pad, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad; and

an alternating pressure pad interposed between the upper and lower foam pads.

30. The heating pad system of claim 6 further comprising:

a display/record device connected to the power unit for displaying a temperature of the person on the support structure; and

an auxiliary temperature sensor connected to the display/record device and being positionable adjacent to the person on the support structure for determining the temperature of the person and transmitting the determined temperature to the display/record device.

31. The heating pad system of claim 6 wherein the heating pad further comprises a waterproof cover enclosing at least a portion of the foam pad and the thermal-electric heating element, and further comprising:

a display/record device connected to the power unit for providing a signal indicating a presence of moisture on the waterproof cover; and

an auxiliary moisture sensor disposed on the waterproof cover and connected to the display/record device for determining the presence of moisture on the waterproof cover and transmitting the determined presence of moisture to the display/record device.

32. The heating pad system of claim 6 further comprising:

a display/record device connected to the power unit for displaying a blood pressure of the person on the support structure; and

an auxiliary blood pressure cuff connected to the display/record device and being releasably attachable to the person on the support structure for determining the blood pressure of the person and transmitting the determined blood pressure to the display/record device.

33. The heating pad system of claim 6 further comprising:

an auxiliary grounding device connected to the power unit and being positionable in contact with the person on the support structure to electrically ground the person on the support structure.

34. A heating pad system useable for warming a person on a mobile support structure, the heating pad system comprising:

a lower foam pad;

an upper foam pad;

a thermal-electric heating element sandwiched between the upper and lower foam pads, the thermal-electric heating element and the upper and lower foam pads comprising a heating pad positionable on the mobile support structure; and

a power unit attachable to the mobile support structure, the power unit having a power source for providing electrical power to the thermal-electric heating element, the power unit including a control panel having at least one temperature selector, the temperature selector for selecting at least one heating pad temperature.

35. The heating pad system of claim 34 wherein the mobile support structure is a gurney.

36. The heating pad system of claim 34 wherein:

the control panel is a first control panel having a first set of temperature selectors corresponding to a first set of selected heating pad temperatures; and wherein

the power unit further comprises a second control panel, the second control panel having a second set of temperature selectors corresponding to a second set of selected heating pad temperatures.

37. The heating pad system of claim 34 wherein:

the control panel is a side-facing first control panel facing in a first direction, the first control panel having a first set of temperature selectors corresponding to a first set of selected heating pad temperatures; and

the power unit further comprises a side-facing second control panel facing in a second direction, the second control panel having a second set of temperature selectors corresponding to a second set of selected heating pad temperatures.

38. The heating pad system of claim 34 wherein:

the control panel is a side-facing first control panel facing in a first direction, the first control panel having a first set of temperature selectors corresponding to a first set of selected heating pad temperatures; and wherein

the power unit further comprises a side-facing second control panel facing in a second direction that is opposite to the first direction, the second control panel having a second set of temperature selectors corresponding to a second set of selected heating pad temperatures.

39. The heating pad system of claim 34 wherein:

the control panel is a side-facing first control panel facing in a first direction, the first control panel having a set of temperature selectors corresponding to selected heating pad temperatures; and wherein

the power unit further comprises a side-facing second control panel facing in a second direction opposite to the first direction, the second control panel having the set of temperature selectors corresponding to the selected heating pad temperatures.

40. The heating pad system of claim 34 wherein the mobile support structure has a bed portion suitable for the person to lay on, and wherein the power unit is releasably attachable to the mobile support structure at least partially disposed beneath at least a portion of the bed portion.

41. The heating pad system of claim 34 wherein the power unit is optionally connectable to an AC power source, wherein when the power unit is connected to the AC power source the power unit can provide electrical power to the thermal-electric heating element from the AC power source.

42. The heating pad system of claim 34 wherein the power unit is optionally connectable to a 12-volt DC power source, wherein when the power unit is connected

to the 12-volt DC power source the power unit can provide electrical power to the thermal-electric heating element from the 12-volt DC power source.

43. The heating pad system of claim 34 wherein:

the power unit is optionally connectable to an AC power source, wherein when the power unit is connected to the AC power source the power unit can provide electrical power to the thermal-electric heating element from the AC power source; and wherein

the power unit is optionally connectable to a 12-volt DC power source, wherein when the power unit is connected to the 12-volt DC power source the power unit can provide electrical power to the thermal-electric heating element from the 12-volt DC power source.

44. The heating pad system of claim 34 wherein:

the heating pad further comprises a waterproof cover at least partially enclosing the lower foam pad, the upper foam pad, and the thermal-electric heating element; and wherein

the power unit provides electrical power to the thermal-electric heating element via a utility cord, the utility cord passing through an opening in the cover, the opening being hermetically sealed.

45. The heating pad system of claim 34 wherein the heating pad further comprises a sheet of reflective material positioned adjacent to the lower foam pad such that the lower foam pad is disposed between the sheet of reflective material and the thermal-electric heating element.

46. The heating pad system of claim 34 wherein the upper foam pad has an upper surface, and wherein the heating pad system further comprises:

a first temperature sensor for measuring heating pad temperatures, wherein at least a portion of the first temperature sensor is positioned adjacent to the upper

surface of the upper foam pad, the first temperature sensor being operably connected to the power unit, and wherein the power unit includes a temperature control circuit coupled to the temperature sensor to control electrical power provided to the thermal-electric heating element based on a selected heating pad temperature and a measured heating pad temperature; and

a second temperature sensor for measuring heating pad temperatures, wherein at least a portion of the second temperature sensor is positioned adjacent to the upper surface of the upper foam pad, the second temperature sensor being operably connected to the power unit, and wherein the power unit includes a temperature display for displaying measured heating pad temperatures received from the second temperature sensor.

47. The heating pad system of claim 34 wherein the upper foam pad has an upper surface and the power unit includes a temperature display for displaying measured heating pad temperatures, and wherein the heating pad system further comprises:

a temperature sensor for measuring heating pad temperatures, wherein at least a portion of the temperature sensor is embedded in the upper foam pad adjacent to the upper surface, the temperature sensor being operably connected to the power unit for providing measured heating pad temperatures to the temperature display.

48. The heating pad system of claim 34 wherein:

the upper foam pad is comprised of an ester-based viscoelastic memory foam;

the lower foam pad is comprised of a foam having an IFD rating of at least 30;

the lower foam pad is comprised of a foam having an IFD rating of no more than 40; and

the thermal-electric heating element is comprised of a carbon-filled plastic having one or more copper braids for conducting electrical current for generating heat.

49. The heating pad system of claim 34 wherein the control panel further includes a power-loss indicator for indicating a pre-selected status of the power source.

50. The heating pad system of claim 34 wherein the control panel further includes a power-loss indicator for indicating a pre-selected status of the power source, the power-loss indicator being a visual indicator.

51. The heating pad system of claim 34 wherein the control panel further includes a power-loss indicator for indicating a pre-selected status of the power source, the power-loss indicator being a visible light source.

52. The heating pad system of claim 34 wherein the control panel further includes a power-loss indicator for indicating a pre-selected status of the power source, the power-loss indicator being a digital display.

53. The heating pad system of claim 34 wherein the control panel further includes a power-loss indicator for indicating a pre-selected status of the power source, the power-loss indicator being an audio indicator.

54. A heating pad comprising:

a foam pad;

a carbon-filled plastic thermal-electric heating element having one or more copper braids for generating heat, the thermal-electric heating element being disposed adjacent to the foam pad; and

a waterproof and flame-retardant cover enclosing at least a portion of the foam pad and the thermal-electric heating element.

55. The heating pad of claim 54 wherein the foam pad is an upper foam pad, and wherein the heating pad further comprises:

a lower foam pad, the thermal-electric heating element being sandwiched between the upper and lower foam pads.

56. The heating pad of claim 54 wherein the foam pad is an upper foam pad, and wherein the heating pad further comprises:

a lower foam pad, the upper foam pad being denser than the lower foam pad, the thermal-electric heating element being sandwiched between the upper and lower foam pads.

57. The heating pad of claim 54 wherein the foam pad is an upper foam pad comprised of a foam having an IFD rating between 10 and 30 inclusive, and wherein the heating pad further comprises:

a lower foam pad, the lower foam pad being comprised of a foam having an IFD rating of between 25 and 45 inclusive, the thermal-electric heating element being sandwiched between the upper and lower foam pads.

58. The heating pad of claim 54 wherein the foam pad is an upper foam pad comprised of a foam having a density of between 3.5 to 4.5 lb. per cubic foot inclusive, and wherein the heating pad further comprises:

a lower foam pad, the lower foam pad being comprised of a foam having a density of between 2.0 to 3.0 lb. per cubic foot inclusive, the thermal-electric heating element being sandwiched between the upper and lower foam pads.

59. The heating pad of claim 54, further comprising:

a sheet of reflective material covering at least a portion of the thermal-electric heating element between the thermal-electric heating element and the foam pad.

60. A method for warming a person on a support structure such as a gurney or an operating room table, the method comprising:

providing a heating pad positionable on the support structure, the heating pad comprising:

a thermal-electric heating element comprising one or more copper elements suspended in a carbon-filled plastic for conducting electricity;

a foam pad disposed adjacent to the thermal-electric heating element, the foam pad overlaying at least a portion of the heating element, and

a form-fitting waterproof cover enclosing at least a portion of the foam pad and the thermal-electric heating element;

positioning the heating pad on the support structure;

positioning the person on the heating pad; and

providing electrical power to the thermal-electric heating element.

61. The method of claim 60 further comprising:

providing a power unit for providing electrical power to the thermal-electric heating element, the power unit including a control panel having at least one temperature selector, the temperature selector for selecting at least one heating pad temperature.

62. The method of claim 60 wherein the foam pad is an upper foam pad, the heating pad further comprising:

a lower foam pad, the thermal-electric heating element being sandwiched between the upper foam pad and the lower foam pad, the form-fitting waterproof cover enclosing at least a portion of the upper foam pad, the lower foam pad and the thermal-electric heating element.

63. The method of claim 60 further comprising:

providing a power unit for providing electrical power to the thermal-electric heating element, the power unit including a control panel having at least one

temperature selector, the temperature selector for selecting at least one heating pad temperature; and

selecting a heating pad temperature using the at least one temperature selector.